Fracture risk assessment

Andrew Grey
Competing Interests

Financial:
Shareholder in Auckland Bone Density

Academic:
Research publications in management of osteoporosis/fracture risk
Osteoporosis is NOT low bone density
Incidence of hip, vertebral, and distal forearm fracture

TEM 1992;3:224
Clinical risk factors for fracture

Age
Gender
Low BMD by DXA
Low body weight
Previous fracture during adulthood
Family history of hip fracture
Falls/frailty
Smoking

Osteoporosis Int 2000;11:192-202
Secondary causes of osteoporosis

**Diseases**
- Hypogonadism
- Primary hyperparathyroidism
- Thyrotoxicosis
- Cushings syndrome
- Anorexia nervosa
- Malabsorption
- Rheumatoid arthritis
- Connective tissue disorders
- Inflammatory bowel disease

**Drugs**
- Glucocorticoids
- Thiazolidinediones
- Aromatase inhibitors
- DMPA
Annual Risk of Hip Fracture According to Number of Risk Factors and the Age-Specific Calcaneal Bone Density

Rate of Hip Fracture (per 1000 woman-years)

Calcaneal Bone Density

FRAX prediction tool

**Questionnaire:**

1. Age (between 40-90 years) or Date of birth
   - Age: 80
   - Date of birth: Y: M: D: 
2. Sex
   - Male
   - Female
3. Weight (kg) 65
4. Height (cm) 165
5. Previous fracture
   - No
   - Yes
6. Parent fractured hip
   - No
   - Yes
7. Current smoking
   - No
   - Yes
8. Glucocorticoids
   - No
   - Yes
9. Rheumatoid arthritis
   - No
   - Yes
10. Secondary osteoporosis
    - No
    - Yes
11. Alcohol 3 or more units per day
    - No
    - Yes
12. Femoral neck BMD (g/cm²)
    - T-Score: -3

**BMI 23.9**
The ten year probability of fracture (%)

- Major osteoporotic: 21
- Hip fracture: 9.0

View NOGG Guidance
FRAX facts

• Predicts risk of major osteoporotic fracture = clinical spine, shoulder, hip, forearm
• Predicts risk of hip fracture
• Provides 10 year estimate only
• Only includes previous fracture as a Y/N variable
• Does not include falls
• Don’t include fractures of hand, foot, face, rib, or childhood fractures
• Incorporates competing risk of death, so in the elderly the long prediction horizon (10y) is a “remaining estimated lifetime” risk
• Can be used without BMD variable
• Modest performance
Garvan calculator

Garvan facts

- Predicts risk of fractures of hip, vertebrae (symptomatic), wrist, metacarpal, humerus, scapula, clavicle, distal femur, proximal tibia, patella, pelvis and sternum.
- Predicts risk of hip fracture
- Doesn’t incorporate mortality risk
- Provides 5 and 10yr estimates
- Can be used without BMD variable
- Modest performance
### Treatment of an individual

<table>
<thead>
<tr>
<th>10y # risk (%)</th>
<th>10y # risk during CaD Rx (%)</th>
<th>NNT (10y)</th>
<th>NNB (10y)</th>
<th>10y # risk during BP Rx (%)</th>
<th>NNT (10y)</th>
<th>NNB (10y)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4.5</td>
<td>200</td>
<td>199</td>
<td>3</td>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>10</td>
<td>9</td>
<td>100</td>
<td>99</td>
<td>7</td>
<td>33</td>
<td>32</td>
</tr>
<tr>
<td>20</td>
<td>18</td>
<td>50</td>
<td>49</td>
<td>13</td>
<td>14</td>
<td>13</td>
</tr>
<tr>
<td>30</td>
<td>27</td>
<td>33</td>
<td>32</td>
<td>20</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td>40</td>
<td>36</td>
<td>25</td>
<td>24</td>
<td>27</td>
<td>8</td>
<td>7</td>
</tr>
</tbody>
</table>